**Topics 08 – Acids and Bases (SL/HL 1)**

**Topic 8: Acids and bases (6 hours)**   
**8.1 Theories of acids and bases - 2 hours**   
8.1.1 Define acids and bases according to the Brønsted–Lowry and Lewis theories.(1)   
8.1.2 Deduce whether or not a species could act as a Brønsted–Lowry and/or a Lewis acid or base. (3)   
8.1.3 Deduce the formula of the conjugate acid (or base) of any Brønsted–Lowry base (or acid). (3)   
**8.2 Properties of acids and bases - 1 hour**   
8.2.1 Outline the characteristic properties of acids and bases in aqueous solution. (2)  
  
**8.3 Strong and weak acids and bases - 2 hours**   
8.3.1 Distinguish between strong and weak acids and bases in terms of the extent of dissociation, reaction with water and electrical conductivity. (2)   
8.3.2 State whether a given acid or base is strong or weak. (1)   
8.3.3 Distinguish between strong and weak acids and bases, and determine the relative strengths of acids and bases, using experimental data. (2)   
  
**8.4 The pH scale - 1 hour**   
8.4.1 Distinguish between aqueous solutions that are acidic, neutral or alkaline using the pH scale. (2)   
8.4.2 Identify which of two or more aqueous solutions is more acidic or alkaline using pH values. (2)   
8.4.3 State that each change of one pH unit represents a 10-fold change in the hydrogen ion concentration [H+(aq)]. (1)   
8.4.4 Deduce changes in [H+(aq)] when the pH of a solution changes by more than one pH unit. (3)   
  
**Topic 18: Acids and bases (10 hours)**  
**18.1 Calculations involving acids and bases - 4 hours**   
18.1.1 State the expression for the ionic product constant of water (Kw). (1)   
18.1.2 Deduce [H+(aq)] and [OH–(aq)] for water at different temperatures given Kw values. (3)   
18.1.3 Solve problems involving [H+(aq)], [OH–(aq)], pH and pOH. (3)   
18.1.4 State the equation for the reaction of any weak acid or weak base with water, and hence deduce the expressions for Ka and Kb. (1)   
18.1.5 Solve problems involving solutions of weak acids and bases using the expressions: Ka × Kb = Kw   
pKa + pKb = pKw pH + pOH = pKw. (3)   
18.1.6 Identify the relative strengths of acids and bases using values of Ka, Kb, pKa and pKb. (2)   
**18.2 Buffer solutions - 2 hours**   
18.2.1 Describe the composition of a buffer solution and explain its action. (3)   
18.2.2 Solve problems involving the composition and pH of a specified buffer system. (3)   
  
**18.3 Salt hydrolysis - 1 hour**   
18.3.1 Deduce whether salts form acidic, alkaline or neutral aqueous solutions. (3)   
**18.4 Acid–base titrations - 2 hours**   
18.4.1 Sketch the general shapes of graphs of pH against volume for titrations involving strong and weak acids and bases, and explain their important features. (3)   
**18.5 Indicators - 1 hour**   
18.5.1 Describe qualitatively the action of an acid–base indicator. (2)   
18.5.2 State and explain how the pH range of an acid–base indicator relates to its pKa value. (3)   
18.5.3 Identify an appropriate indicator for a titration, given the equivalence point of the titration and the pH range of the indicator. (2)